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GB 2017285 A

WO 95/22724 A1

US 4612777 A

US 4179900 A

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(54) Display cabinet

(57) Perishable product display cabinet (1), preferably refrigerated, includes means (7) arranged to provide, in a product display area (2) of the cabinet (1), a primary atmosphere of cooled, moisture-laden air, which may be flowing from ducting (8) preferably at low velocity, and means (6) arranged to provide in the product display area (2) an auxiliary atmosphere of moisture, preferably in the form of a mist or fog of water droplets. The means (7) may be ultrasonic and may include an ultraviolet light for controlling bacterial growth.

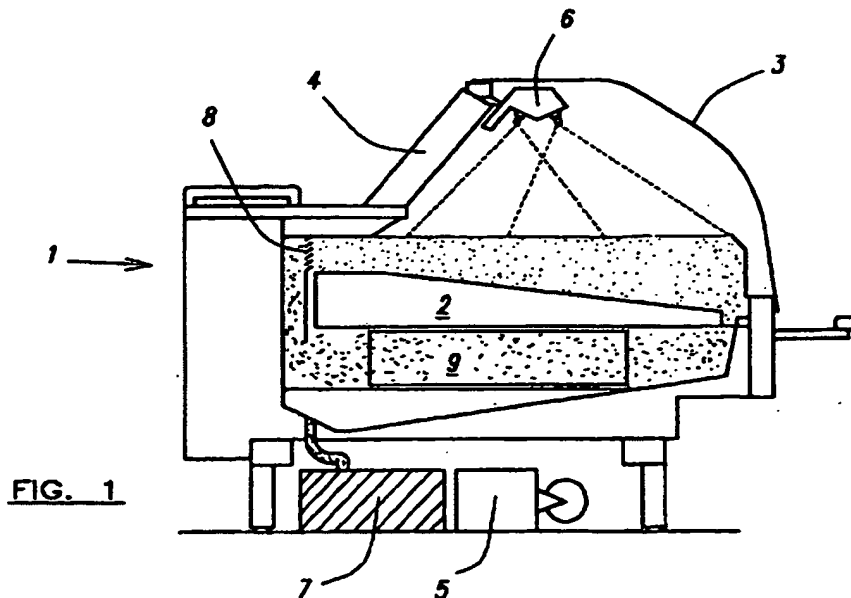


FIG. 1

3 4 5

1/3

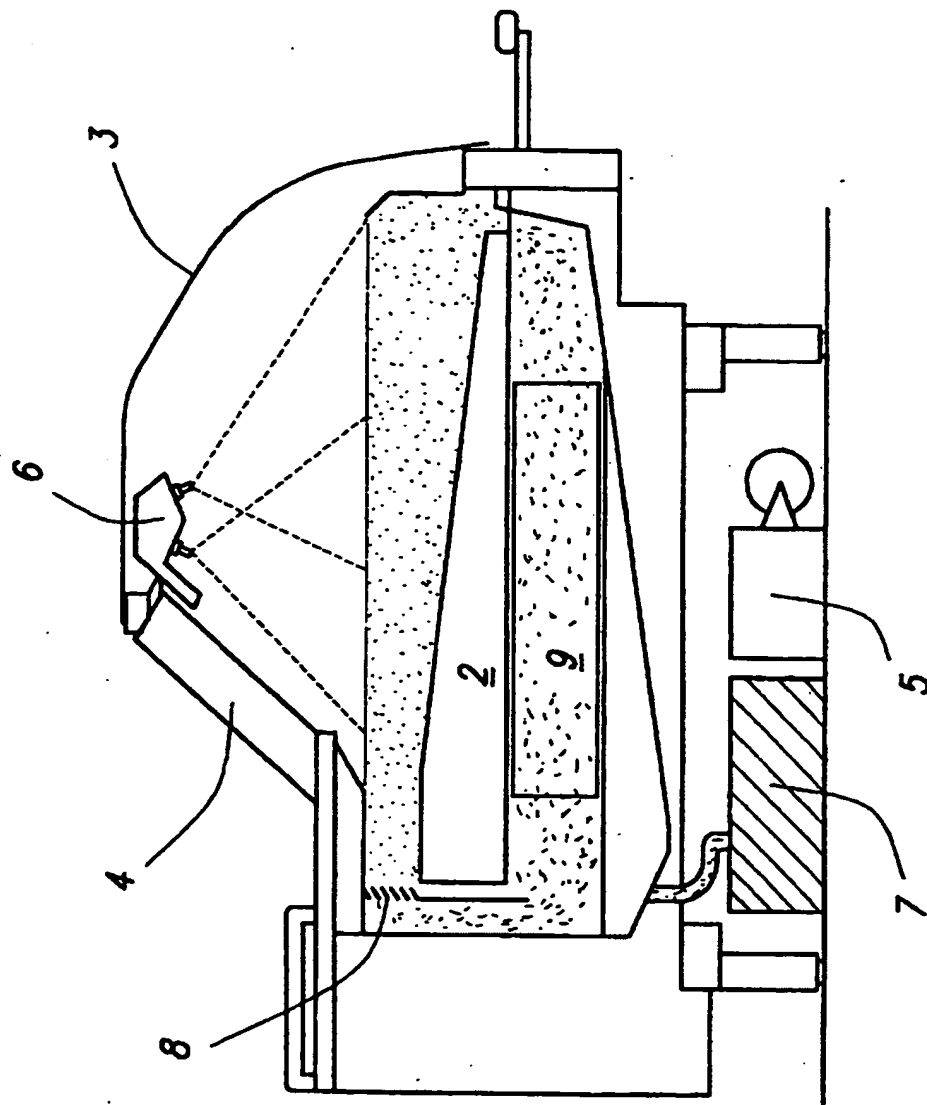


FIG. 1

FIG. 2

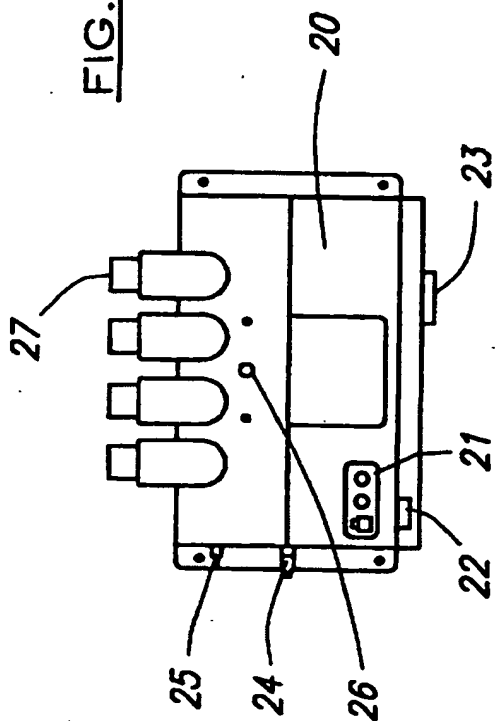


FIG. 4

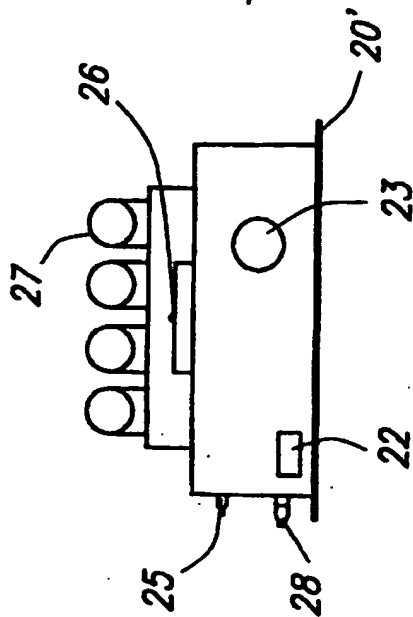
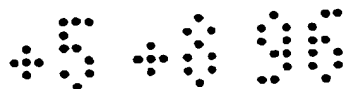
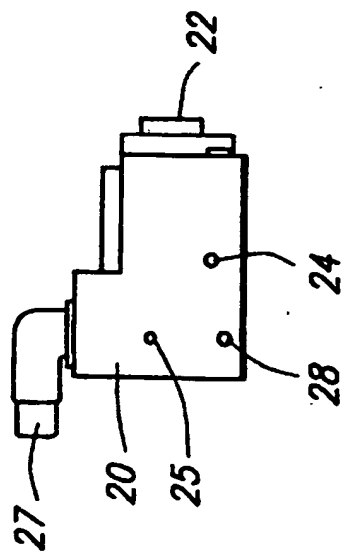


FIG. 3



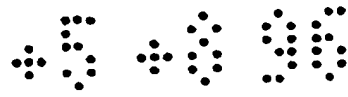


FIG. 5

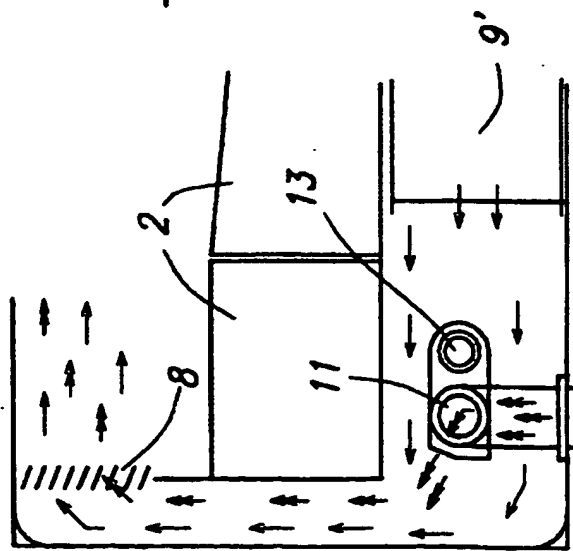
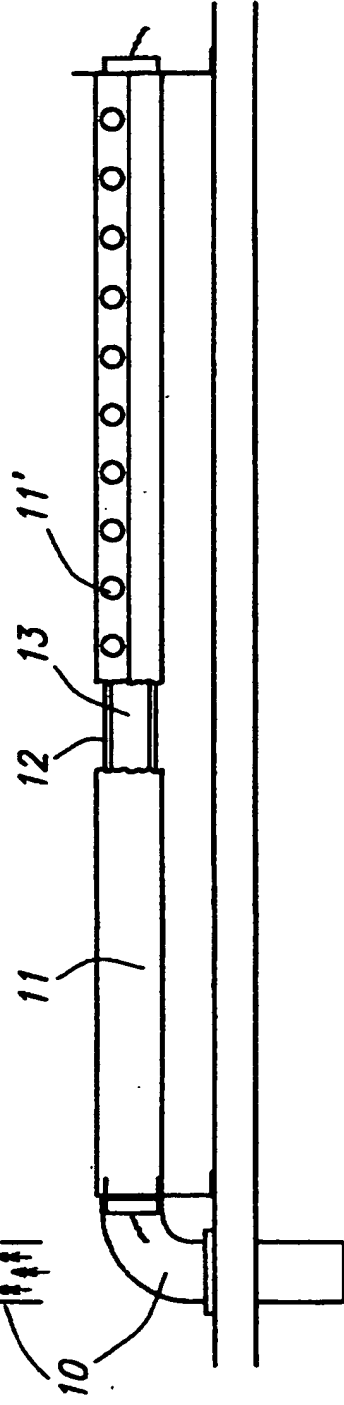


FIG. 6



PERISHABLE PRODUCT DISPLAY

The present invention relates to product display apparatus and an associated method for the preservation and display of a merchantable but perishable product, such as cooked or fresh fish or meat.

It is well known in the field of the merchandising of perishable products, especially a food product, such as cooked or fresh fish, to display the products in a refrigerated serve-over display cabinet. Known types of such display cabinet include a refrigerated display deck intended to receive and support a layer of partially crushed ice in which the displayed product may be partially packed or on which the displayed product may be laid.

Known types of refrigerated serve-over display cabinet suffer from a number of disadvantages. Ice can cause microbiological problems through cross-contamination. The constant desire to maintain lower product core temperatures in order more effectively to maintain the quality of the product on display necessitates the use of fan-assisted refrigeration and this causes moisture to be drawn out of the product with consequential product dehydration.

The use of a fogging system can effectively counteract the drying effect of the refrigeration but cannot maintain a sheen or sacrificial layer of moisture on the surface of the product. This sheen or sacrificial layer is desirable as it both makes the product look more attractive and, in the case of raw fish, protects the mucus coating on the surface of the fish which is a natural protective layer. It also

assists in cooling the surface of the product as it evaporates, as well as promoting rehydration in living fresh produce, fruit, vegetables, flowers and other plants

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The present invention aims to overcome, or at least substantially reduce, the disadvantages of the known refrigerated serve-over display cabinets discussed above and is particularly concerned with a perishable product display system which does not have to rely necessarily on the use of ice to maintain the quality, freshness and appearance of the product, particularly fish products, on display.

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A first aspect of the present invention provides perishable product display apparatus comprising a display cabinet, preferably refrigerated, including means arranged to provide, in a product display area of the cabinet, a primary atmosphere of cooled, moisture-laden air, which may be flowing preferably at low velocity, and means arranged to provide in the product display area an auxiliary atmosphere of moisture, preferably in the form of a mist or fog of water droplets.

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A second aspect of the invention resides in a method of preserving a perishable product in a display area of a display cabinet, comprising providing in the product display area a primary atmosphere of cooled, moisture-laden air, which may be flowing, preferably at low velocity, and an auxiliary atmosphere of moisture, preferably in the form of a mist or fog of water droplets.

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If the display cabinet is substantially closed, the primary atmosphere provision means may be operated

intermittently, for example, by a humidistat, or periodically by a timer, in order to provide primary moisture maintenance of products within the cabinet. If, however, the cabinet is at least partially open to
5 the atmosphere, then the primary atmosphere provision means is preferably operated continuously, to provide the required primary moisture maintenance within the cabinet.

10 Thus, it could be said that the present invention generally provides a combination of a primary fogging or air spray humidification system which effectively counteracts the drying effect of any refrigeration, with an auxiliary misting or fogging system in, say,
15 a refrigerated display cabinet which, preferably, is a fan-assisted, refrigerated serve-over display cabinet.

In use, the auxiliary misting or fogging system
20 may be arranged to spray or fog intermittently or periodically the product with a finely atomised mist of water droplets which results in a layer of moisture being deposited on the surface of the product. This layer of moisture maintains the appearance and
25 condition of the product by creating a sheen or sacrificial layer on the surface thereof and reducing the temperature of the product by the evaporative cooling effect as the moisture evaporates extracting latent heat of evaporation of water therefrom. In the
30 case where the product is raw fish, the sacrificial layer of moisture creates a sheen which enhances the attractiveness of the appearance of the fish and also protects its natural mucus coating. In the case of
living products, such as fresh produce, fruit
35 vegetables and flowers and other plants, the moisture layer provides extra moisture for promoting

rehydration of the products.

By the present invention, it has been found that the core and surface temperatures of the product, such as fresh fish, and the product moisture level can be maintained without the use of ice as in conventional refrigerated, or otherwise cooled, display systems. In the case of living products, the effect is to slow down the dying process and to further extend display or shelf life.

A third aspect of the invention provides apparatus for controlling bacterial growth in a fluid, such as airborne moisture to be used as moisture-laden air in preserving a perishable product displayed in a display cabinet and/or condensation or other moisture in associated equipment, by treatment thereof with bacteriacidal radiation, wherein the apparatus comprises a radiation source which is capable of generating bacteriacidal radiation at a predetermined temperature and is arranged to enable the fluid to be treated with the so-generated radiation and means arranged to operate the radiation source intermittently to maintain its temperature at the predetermined temperature at which bacteriacidal radiation is generated thereby.

In accordance with a fourth aspect of the invention, there is provided a method of controlling bacterial growth in a fluid, such as airborne moisture being used as moisture-laden air in preserving a perishable product being displayed in a display cabinet and/or condensation or other moisture in associated equipment, by treatment thereof with bacteriacidal radiation, wherein a radiation source capable of generating bacteriacidal at a predetermined

temperature, is operated intermittently to maintain its temperature at that predetermined temperature at which bacteriacidal radiation is generated.

5 The radiation source is preferably one which generates ultraviolet light, although other sources may be used depending upon the bacteria to be controlled.

10 Also, the predetermined temperature at which bacteriacidal radiation is generated may be within a predetermined range of temperatures at which such radiation is generated. Further, intermittent
15 assists in maintaining the irradiated fluid at a low temperature at which less bacterial growth occurs than would otherwise take place if the source were to be operated continuously.

20 Apparatus in accordance with the third aspect of the invention defined above, may be incorporated in a fogging system employed in apparatus according to the first aspect of the invention defined above. Similarly, the corresponding inventive methods may be
25 combined. For example, the inventive bacterial control apparatus using an intermittently-operated ultraviolet light source, may be incorporated in one or more stages of a fogging system for providing the primary atmosphere in the product display area of the
30 cabinet of the inventive display apparatus. In a preferred embodiment of this arrangement, an ultraviolet light source is employed in each of the water source or reservoir, the ultrasonic nebulising chamber and the fog distribution tube of the fogging
35 system and is operated intermittently to maintain it at its predetermined temperature at which

bacteriacidal ultraviolet light is generated and to keep the temperature of the water and/or airborne moisture (fog) derived therefrom as low as possible to reduce unnecessary and unwanted growth of bacteria therein.

If the radiation source were to be operated continuously or for unnecessarily long periods, then its temperature would rise above that or those at which bacteriacidal radiation is generated efficiently, thereby reducing its effectiveness considerably. Also, such continuous operation of the radiation source may well increase the temperature of the water and/a fog generated in the system, thereby increasing unwanted bacterial growth and, hence, the risk of contaminating the products on display.

Another aspect of the invention resides in a system, such as a misting or fogging system, for generating airborne moisture, the system comprising a moisture generator, for example a nebuliser, and apparatus in accordance with the third aspect of the invention defined above, which apparatus is associated with the generator for controlling any bacterial growth in the so-generated moisture.

A further aspect of the invention resides in a system, such as a misting or fogging system, for delivering airborne moisture into a display cabinet for perishable products, the system comprising distribution means having a moisture receiving inlet and an outlet for delivering the so-received moisture into the cabinet and apparatus according to the third aspect of the invention defined above, which apparatus is associated with the distribution means, preferably between the inlet and outlet thereof, for controlling

any bacterial growth in the moisture.

Preferably, the distribution means is a tubular member which extends at least partially along the length of the display cabinet and has one end (inlet) connected to a moisture generator, such as a nebuliser or misting system, with the outlet preferably being in the form of a plurality of apertures, for example, nozzles, spaced along the length of the member which may be located at any suitable delivery position with respect to the display cabinet.

Various aspects of the present invention will now be described in greater detail by way of example and with reference to the presently preferred embodiment thereof illustrated in the accompanying diagrammatic drawings in which;

Figure 1 is a partial cross-sectional side view of a serve-over display cabinet;

Figures 2, 3 and 4 are various views of an ultrasonic fogging unit used in the present invention; and

Figures 5 and 6 show details of a fog distribution arrangement used in the present invention.

In order to assist in an understanding of the present invention and to enable a reader to gain an appreciation of the advance which it offers over the prior art and the contribution it makes to enhanced fresh product merchandising and display, there follows a brief review of known moisture and/or temperature control systems in use within fresh product display

cabinets.

HUMIDIFICATION

- 5 An air spray humidification system adjusts the environment surrounding a displayed product, neutralising the drying effect of cold, refrigerated air.
- 10 Typically, a humidification system provides a low velocity flow of moistened air through a nozzle, the output from the nozzle comprising, for example, 5% water and 95% air.
- 15 The following are the advantages of humidification:
- Water droplets introduced into the atmosphere evaporate into invisible vapour which offers the driest form of moisture maintenance, suitable for
 - 20 the most delicate products;
 - The level of humidity is variable and controllable by humidistat sensors;
 - Requires only one nozzle to be present in the display area for every 12 feet of
 - 25 display, which helps with cleaning;
 - Can be used with all types of product;
 - Enhances the cooling of a refrigeration system, and can extend the working life of a cabinet.
- 30 The following are disadvantages of humidification:
- Can only operate in an enclosed environment, so in the case of a serve-over display cabinet doors have to be fitted;
 - 35 • Must only be used in refrigerated cabinets.

FOGGING

5 A fogging system bathes the product in a gentle fog of water-saturated air. The droplets are minute and remain suspended in the air flow for a minute or so. The air flow is usually of low velocity.

The following are advantages of fogging:

- 10 • Will operate in both open and closed display cabinets;
- Provides very localised moisture maintenance by enveloping the product in water-saturated air;
- Cost effective, as fogging does not require humidistat control or sliding doors and, 15 installation costs are reduced;
- Is suitable for both single deck and multi deck, open or closed display cabinets;
- Can be used with all types of product, particularly fresh food products, flowers and 20 plants;
- Enhances the cooling of a refrigeration system and can extend the working life of a cabinet; and
- Heavy or double fogging promotes absorption of moisture through the skin or leaves of living 25 plants and fresh produce promoting rehydration and slowing down the dying process.

The following are disadvantages of fogging:

- 30 • Is a continuous process in an open display cabinet and is only effective when the fog is visible;
- Must only be used in refrigerated cabinets.

MISTING

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A misting system periodically sprays a finely

atomised mist of water on to products on display. The mist is discharged at high velocity and comprises 100% water.

5 The following are advantages of misting:

- Deposits a sacrificial layer of moisture on to the surface of the product which, in the case of fresh produce that are living plants enables the moisture to be absorbed through skin or leaves and slow down the drying process;
- 10 • As the sacrificial layer of moisture evaporates between misting cycles, which are usually 4 seconds mist in every 15 minutes, the product surface is further cooled by evaporative cooling;
- 15 • Can be used in both ambient and refrigerated display cabinets.

 The following are disadvantages of misting;

- Is a wet system and can only be used on certain fresh vegetables and salads or wet fish displays;
- 20 • Not suitable for multi-deck displays.

 The present invention will now be described with reference to an embodiment of a fan-assisted, refrigerated serve-over display cabinet incorporating a primary fogging system and an auxiliary high pressure misting system or auxiliary fogging system.

30 Referring to Figure 1 of the drawings, there is shown a fan-assisted, refrigerated, serve-over display cabinet 1 comprising a display deck 2 enclosed within a housing having a transparent front cover 3 through which products, which may be displayed on the display deck 2, can be viewed by potential customers. At the rear is access means 4 by which serving staff can gain access to products on the deck display 2.

Mounted below the cabinet 1 is an auxiliary, high pressure misting system 5 which, in use, delivers into the display area within the cabinet 1 and over the products displayed on the display deck 2 a mist of
5 finely atomised water droplets discharged from a mist delivering and distribution tube 6 disposed above the display deck 2.

Also mounted below the cabinet 1 is a primary,
10 ultrasonic fogging system 7 which, in use, supplies into the display area within the cabinet 1, which display area includes the display deck 2, a continuous, low velocity flow of fog discharged from ducting 8 towards the rear of the cabinet 1.

15 Also discharged from ducting 8 with the fog is a flow of cooled air. Below the display deck 2 is a closed recirculation duct 9 incorporating a fan and refrigeration coil for the purpose of receiving from
20 the display area moist air for re-cooling and recirculation to the display area via the ducting 8.

With reference to Figures 2, 3 and 4 of the drawings there will be seen an ultrasonic fogging
25 system which may constitute the system 7 referred to above.

The primary, ultrasonic fogging system comprises a stainless steel body 20 having a fixing plate 20' and including a control panel 21 and remote control
30 connection 22. The control panel 21 includes inter alia a power on/off switch and fuses. The body 20 is formed with a cold air intake 23 to an air filter, a water inlet port 24, a water overflow port 25, and a
35 water drain port 28.

There is also an ultraviolet light 26 which is operated intermittently to maintain its working temperature at one at which bacteriacidal UV radiation is generated and to prevent the fog temperature from
5 rising to an unnecessarily high value at which unacceptable bacterial growth occurs. Fog produced by ultrasonic disturbance of water within the fogging system when in operation, will leave the system and be ducted therefrom by an elbowed duct 27.

10

With reference to Figures 5 and 6 of the drawings, which show details of the arrangements for introducing the produced fog into the serve-over display cabinet 1 of Figure 1, the fog will be
15 conducted by an elbowed duct 10, which may be the same as the elbowed duct 27 in Figures 2, 3 and 4, to the inlet of a fog distribution bar 11 arranged within the recirculation duct 9 of Figure 1. The fog distribution bar 11 includes fog outlet nozzles 11' spaced therealong and is suitably supported from the
20 base of the display cabinet. Upstream of the fog distribution bar 11, and as best seen in Figure 5, is an intermittently-operated ultraviolet emitting tube 13 surrounded by a protective quartz glass tube 12.

25

In operation, fog introduced into the recirculation duct 9 (which includes the refrigeration coil 9') will be moved by the effort of the fan (not shown) incorporated within the recirculation duct 9 in
30 the direction of the arrows to discharge into the display area and over the display deck 2 by way of the ducting 8. Moisture laden air being drawn from and recirculated to the display area through the recirculation duct 9 will be irradiated with
35 ultraviolet rays from the tube 13, and thus purified of any bacteriological contamination. Within the

display area and above the display deck 2 there will be created a flow of cooled air and fog illustrated by the dotted shading in Figure 1, and also a mist produced from the nozzles of the mist distribution and delivery tube 6. That tube 6 is also provided with an
5 intermittently-operated UV source extending longitudinally thereof.

The auxiliary misting system 5 incorporates
10 controls which allow the periodicity of the mist spray to be varied, but preferably the misting system 5 will periodically spray finely atomised droplets into the display area for approximately 2 seconds in every 20 minutes. Such periodic application of mist produces
15 a sacrificial layer of moisture on the product, which layer maintains the appearance and condition of the product and further reduces its surface and core temperatures through the evaporative cooling effect which extracts the latent heat of evaporation of water
20 from the product due to the evaporation of the sacrificial moisture layer therefrom.

If fresh food products in the display cabinet should not be wetted for some reason, then an
25 auxiliary fogging system may be used instead of a misting system. In this case, the auxiliary fogging system provides, in combination with the primary fogging system, a double fogging system. One fog distribution bar or set of fog distribution bars
30 constitutes the primary fogging system for counteracting the drying effect of refrigerated air, whilst the auxiliary fogging system provides additional moisture in the form of a mist or fog to promote rehydration of living products, fresh fruit,
35 vegetables, flowers and plants, to slow down the dying process and to extend display and shelf life.

In the present invention the use of the primary fogging system effectively neutralises the drying effect on the product of refrigeration, and the auxiliary misting or fogging system creates and
5 maintains a sheen on the surface of the product which makes the product look more attractive as well as, in the case of raw fish product, protecting the mucus coating on the surface of the fish which is a natural protective coating.

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The present invention therefore enjoys the advantages of both primary fogging and auxiliary misting or fogging systems and, surprisingly, is capable of preserving the quality, freshness and
15 appearance of fresh products whilst dispensing with the need for a bed of ice.

Thus, the present invention creates an improved system for displaying perishable products in that it
20 reduces the possibility of microbiological contamination of the products, is easier and cleaner to maintain, and is very cost effective by virtue of the elimination of the entire ice handling cycle from the system.

25

Without compromising the broad concept, efficiency or effectiveness of the present invention, the primary fogging system referred to in the foregoing may be replaced, if desired, by an air spray
30 humidification system which, by virtue of its combination with an auxiliary misting or fogging system as provided for by the present invention, will also enable perishable products to be preserved and displayed within the serve-over display cabinet
35 without the need for a packing bed of ice.

The present invention is not limited to the details of the particular embodiment described above, but extends to all variants which fall within the scope of the appended claims.

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CLAIMS

1. Perishable product display apparatus comprising a display cabinet including means arranged to provide, in a product display area of the cabinet, a primary atmosphere of cooled, moisture-laden air and means arranged to provide in the product display area an auxiliary atmosphere of moisture.
2. Apparatus according to claim 1, wherein the primary atmosphere of cooled, moisture-laden air is flowing.
3. Apparatus according to claim 2, wherein the primary atmosphere of cooled, moisture-laden air flows at a low velocity.
4. Apparatus according to claim 1, 2 or 3, wherein the primary atmosphere of cooled, moisture-laden air is provided by a primary fogging or air spray humidification system.
5. Apparatus according to any preceding claim, wherein the auxiliary atmosphere of moisture is in the form of a mist or fog of water droplets.
6. Apparatus according to any preceding claim, wherein the auxiliary atmosphere is provided by a misting or fogging system.
7. Apparatus according to any preceding claim, wherein the display cabinet is substantially closed and said primary atmosphere provision means is operable intermittently.
8. Apparatus according to claim 7, wherein said

primary atmosphere provision means is operable intermittently by a humidistat.

9. Apparatus according to claim 7, wherein said
5 primary atmosphere provision means is operable periodically by a timer.

10. Apparatus according to any of claims 1 to 6,
wherein the display cabinet is at least partially open
10 and said primary atmosphere provision means is operable continuously.

11. Apparatus according to claims 6 or any of claims
7 to 10 when dependent upon claim 6, wherein the
15 auxiliary misting or fogging system is arranged to spray or fog intermittently or periodically over a product contained in the display area a finely atomised mist of water droplets.

20 12. Apparatus according to claim 6 or any of claims 7 to 11 when dependent upon claim 6, wherein the auxiliary misting or fogging system is arranged to deliver a mist of finely atomised water droplets over the display area from a mist delivery and distribution
25 tube disposed above the display area.

13. Apparatus according to any preceding claim including a primary fogging system arranged to provide the primary atmosphere of cooled, moisture-laden air
30 in the form of fog from ducting located towards the rear of the display cabinet.

14. Apparatus according to claim 13, wherein the ducting is arranged to deliver also a flow of cooled
35 air.

15. Apparatus according to claim 4 or any of claims 5 to 14 when dependent upon claim 4, wherein the primary fogging system is an ultrasonic fogging system.

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16. Apparatus according to claim 4 or any of claims 5 to 15 when dependent upon claim 4, wherein the primary fogging system comprises an ultrasonic light source operable intermittently to maintain its working temperature at one at which bacteriacidal UV radiation is generated and to prevent the temperature of the so-generated fog from rising to an unnecessarily high value at which unacceptable bacterial growth occurs.

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17. Apparatus according to any preceding claim also including means arranged to receive from the display area moist air for re-cooling and recirculation to that area.

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18. Apparatus according to claim 17, wherein said moist air receiving means comprises a refrigeration coil.

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19. A method of preserving a perishable product in a display area of a display cabinet, comprising providing in the product display area a primary atmosphere of cooled, moisture-laden air and an auxiliary atmosphere of moisture.

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20. A method according to claim 19, wherein the primary atmosphere of cooled, moisture-laden air is flowing.

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21. A method according to claim 20, wherein the primary atmosphere of cooled, moisture-laden air flows at a low velocity.

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22. A method according to claim 19, 20 or 21, wherein the primary atmosphere of cooled, moisture-laden air is provided by a primary fogging or air spray humidification system.

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23. A method according to any of claims 19 to 22, wherein the auxiliary atmosphere of moisture is in the form of a mist or fog of water droplets.

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24. A method according to any of claim 19 to 23, wherein the auxiliary atmosphere is provided by a misting or fogging system.

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25. A method according to any of claims 19 to 24, wherein the primary atmosphere is delivered intermittently into a substantially closed display cabinet

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26. A method according to claim 25, wherein the intermittent delivery of the primary atmosphere is controlled by a humidistat or timer.

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27. A method according to any of claims 19 to 24, wherein the primary atmosphere is delivered continuously into an at least partially open display cabinet.

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28. A method according to any of claims 19 to 27, wherein the auxiliary atmosphere of moisture is sprayed or fogged intermittently or periodically, as a finely atomised mist of water droplets, over a product contained in the display area of the cabinet.

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29. A method according to claim 28, wherein the finely atomised mist of water droplets is delivered over the product in the cabinet display area from a

mist delivery and distribution tube disposed above that area.

5 30. A method according to any or claims 19 to 29, wherein the primary atmosphere is provided in the form of a fog from ducting located towards the rear of the display cabinet.

10 31. A method according to claim 30, wherein a flow of cooled air is also delivered from the ducting.

32. A method according to any of claims 19 to 31, wherein the primary atmosphere is provided from an ultrasonic fogging system.

15

33. A method according to any of claims 19 to 32, wherein the primary atmosphere is subjected intermittently to ultraviolet light, prior to its delivery to the cabinet display area, to maintain the working temperature of the associated UV source at one at which bacteriacidal UV radiation is generated and to prevent the temperature of the atmosphere from rising to an unnecessarily high value at which unacceptable bacterial growth occurs.

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34. A method according to any of claims 19 to 33, wherein moist air from the display area of the cabinet is re-cooled and recirculated to that area.

30 35. Apparatus for controlling bacterial growth in a fluid, such as airborne moisture to be used as moisture-laden air in preserving a perishable product displayed in a display cabinet and/or condensation or other moisture in associated equipment, by treatment thereof with bacteriacidal radiation, wherein the apparatus comprises a radiation source which is

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capable of generating bacteriacidal radiation at a predetermined working temperature and is arranged to enable the fluid to be treated with the so-generated radiation and means arranged to operate the radiation source intermittently to maintain its temperature at the predetermined working temperature of the source at which bacteriacidal radiation is generated thereby.

36. Apparatus according to claim 35, wherein the radiation source is an ultrasonic light source.

37. Apparatus according to claim 35 or 36, wherein the radiation source is arranged to be operated within a range of working temperatures at which bacteriacidal radiation is generated thereby.

38. Apparatus according to claims 35, 36 or 37 in combination with apparatus according to any of claims 1 to 18 for controlling bacterial growth in the primary and/or auxiliary atmosphere within the display cabinet.

39. A method of controlling bacterial growth in a fluid, such as airborne moisture being used as moisture-laden air in preserving a perishable product being displayed in a display cabinet and/or condensation or other moisture in associated equipment, by treatment thereof with bacteriacidal radiation, wherein a radiation source capable of generating bacteriacidal at a predetermined working temperature, is operated intermittently to maintain its temperature at that predetermined working temperature of the source at which bacteriacidal radiation is generated.

40. A method according to claim 39, wherein the

radiation source generates ultraviolet light.

41. A method according to claim 39 or 40, wherein the radiation source operates within a range of working
5 temperatures at which bacteriacidal radiation is generated.

42. A combination of a method according to claim 40
10 or 41 and a method according to any of claims 10 to 34.

43. A system for generating airborne moisture comprising a moisture generator and apparatus according to any of claims 35 to 38, which apparatus
15 is associated with the generator for controlling any bacterial growth in the so-generated moisture.

44. A system according to claim 43 in the form of a misting or fogging system.
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45. A system according to claim 43 or 44, wherein the moisture generator is a nebuliser.

46. A system, such as a misting or fogging system,
25 for delivering airborne moisture into a display cabinet for perishable products, the system comprising distribution means having a moisture receiving inlet and an outlet for delivering the so-received moisture into the cabinet and apparatus according to any of
30 claims 35 to 37, which apparatus is associated with the distribution means, preferably between the inlet and outlet thereof, for controlling any bacterial growth in the moisture.

35 47. A system according to claim 46, wherein the distribution means is a tubular member which extends

at least partially along the length of an associated display cabinet and has one end (inlet) connected to a moisture generator.

5 48. A system according to claim 47, wherein outlet is in the form of a plurality of apertures, for example, nozzles, spaced along the length of the member.

49. Perishable product display apparatus
10 substantially as hereinbefore described with reference to the accompanying drawings.

50. A method of preserving a perishable product substantially as hereinbefore described.

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Application No: GB 9611095.2
Claims searched: 1,19

Examiner: Mick Monk
Date of search: 4 September 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F4H (H2L) F4V (VFC)

Int Cl (Ed.6): F24F 6/12 F25D 17/04 A47F 3/04

Other: ONLINE DATABASE:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2017285 A (LINDE) Example of background art.	1,19
A	US 4612777 (SANYO) Example of mist generator.	1,19
X	US 4179900 (CORRIGAN) Mist produced at two levels (34).	1,19
X	WO 95/22724 A1 (CONTAINER SUPPORT SYSTEMS) Consider whole document.	1,19

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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